

WHAT IS CLAIMED IS:

1. A laser emitting apparatus, comprising:
 - a) an optically transparent layer;
 - b) an incoherent light emitting device including;
 - i) a first transparent electrode located on one side of the optically transparent layer;
 - ii) a light emissive layer adjacent the first electrode to produce a pump beam light which is transmitted out of the incoherent light-emitting device through the first transparent electrode and the optically transparent layer;
 - iii) a second electrode adjacent the light emissive layer;
 - c) a vertical laser cavity structure located on the other side of the optically transparent layer and disposed to receive the pump beam light transmitted from the incoherent light-emitting device through the optically transparent layer, such structure including:
 - i) first means for receiving light from the incoherent light-emitting device and being mainly transmissive or reflective over predetermined ranges of wavelengths;
 - ii) an organic active layer for receiving light from the incoherent light-emitting device and from the first light-receiving means and for producing laser light; and
 - iii) second means for reflecting light from the organic active layer back into the organic active layer, wherein a combination of the two means transmits the laser light; and
 - d) a substrate located adjacent to either the second electrode or the second means.
2. The laser emitting apparatus of claim 1 wherein the second electrode is located on the substrate.
3. The laser emitting apparatus of claim 2 wherein the second electrode is reflective.

4. The laser emitting apparatus of claim 2 wherein the substrate is reflective.
5. The laser emitting apparatus of claim 2 wherein the laser light is emitted through the second means for reflecting light from the organic active layer back into the organic active layer.
6. The laser emitting apparatus of claim 1 wherein the second means for reflecting light from the organic active layer back into the organic active layer is located on the substrate.
7. The laser emitting apparatus of claim 6 wherein the substrate is transparent.
8. The laser emitting apparatus of claim 6 wherein the laser light is emitted through the substrate.
9. The laser emitting apparatus of claim 1 wherein the vertical laser cavity structure is selected to produce laser light in a predetermined range of the spectrum.
10. The laser emitting apparatus of claim 1 wherein by increasing the cross-sectional area of the pump beam light and providing a pump beam light having pulse widths on the order of microseconds, a reduction in the threshold power density is permitted.
11. The laser emitting apparatus of claim 1 wherein the optically transparent layer is a part of the first means for receiving light from the incoherent light-emitting device.
12. The laser emitting apparatus of claim 1 further including active-matrix control circuitry located upon the substrate for controlling the operation of the laser emitting apparatus.
13. The laser emitting apparatus of claim 1 further including passive-matrix control circuitry located upon the substrate for controlling the operation of the laser emitting apparatus.
14. The laser emitting apparatus of claim 1 wherein the incoherent light-emitting device is a top-emitter OLED device.

15. The laser emitting apparatus of claim 1 wherein the incoherent light-emitting device is a bottom-emitter OLED device.

16. The laser emitting apparatus of claim 1 further comprising a plurality of laser emitters located on a common substrate.

17. The laser emitting apparatus of claim 1 wherein the laser light emitted is red, green, or blue.

18. The laser emitting apparatus of claim 1 wherein the organic light-emitting device comprises:

- a) a transparent first electrode;
- b) a hole-transport layer disposed over the first electrode;
- c) a light-emitting layer disposed over the hole transport layer;
- d) an electron-transport layer disposed over the light-emitting layer; and
- e) a second electrode disposed over the electron-transport layer.

19. The laser emitting apparatus of claim 1 wherein the organic light-emitting device comprises:

- a) a second electrode disposed over the substrate;
- b) a hole-transport layer disposed over the second electrode;
- c) a light-emitting layer disposed over the hole transport layer;
- d) an electron-transport layer disposed over the light-emitting layer; and
- e) a transparent first electrode disposed over the electron-transport layer.

20. A laser emitting apparatus, comprising:

- a) an optically transparent layer;
- b) an incoherent light emitting device including;
 - i) a first transparent electrode located on one side of the optically transparent layer;
 - ii) a light emissive layer adjacent the first electrode to produce a pump beam light which is transmitted out of the incoherent light-

emitting device through the first transparent electrode and the optically transparent layer;

- iii) a second electrode adjacent the light emissive layer;
- c) a vertical laser cavity structure located on the other side of the optically transparent layer and disposed to receive the pump beam light transmitted from the organic light-emitting device through the optically transparent layer, such structure including:
 - i) a first DBR mirror for receiving and transmitting light from the organic light-emitting device and being reflective to laser light over a predetermined range of wavelengths;
 - ii) an organic active layer for receiving transmitted light from the first DBR mirror and for producing laser light; and
 - iii) a second DBR mirror for reflecting transmitted OLED light and laser light from the organic active layer back into the organic active layer and for transmitting laser light; and
- d) a substrate located adjacent to either the second electrode or the second DBR mirror

21. The laser emitting apparatus of claim 20 wherein the second electrode is located on the substrate.

22. The laser emitting apparatus of claim 20 wherein the second electrode is reflective.

23. The laser emitting apparatus of claim 20 wherein the substrate is reflective.

24. The laser emitting apparatus of claim 20 wherein the second means for reflecting light from the organic active layer back into the organic active layer is located on the substrate.

25. The laser emitting apparatus of claim 24 wherein the substrate is transparent.

26. The laser emitting apparatus of claim 24 wherein the laser light is emitted through the substrate.

27. The laser emitting apparatus of claim 20 wherein the vertical laser cavity structure is selected to produce laser light in a predetermined range of the spectrum.

28. The laser emitting apparatus of claim 20 wherein the organic light-emitting device comprises:

- a) a transparent first electrode;
- b) a hole-transport layer disposed over the first electrode;
- c) a light-emitting layer disposed over the hole transport layer;
- d) an electron-transport layer disposed over the light-emitting layer; and
- e) a second electrode disposed over the electron-transport layer.

29. The laser emitting apparatus of claim 20 wherein the organic light-emitting device comprises:

- a) a second electrode disposed over the substrate;
- b) a hole-transport layer disposed over the second electrode;
- c) a light-emitting layer disposed over the hole transport layer;
- d) an electron-transport layer disposed over the light-emitting layer; and
- e) a transparent first electrode disposed over the electron-transport layer.

30. A laser emitting apparatus, comprising:

- a) an optically transparent layer;
- b) an incoherent light emitting device including;
 - i) a first transparent electrode located on one side of the optically transparent layer;
 - ii) a light emissive layer adjacent the first electrode to produce a pump beam light which is transmitted out of the incoherent light-emitting device through the first transparent electrode and the optically transparent layer;
 - iii) a second electrode adjacent the light emissive layer;

c) a vertical laser cavity structure disposed to receive a pump beam light transmitted from the organic light-emitting device, such structure including:

i) a first DBR mirror for receiving and transmitting light from the organic light-emitting device and being reflective to laser light over a predetermined range of wavelengths;

ii) an organic active layer for receiving transmitted OLED light from the first DBR mirror and for producing laser light; and

iii) a second DBR mirror for reflecting transmitted OLED light and laser light from the organic active layer back into the organic active layer, the first DBR mirror being adapted to transmit laser light; and

d) a substrate located adjacent to either the second electrode or the second DBR mirror.

31. The laser emitting apparatus of claim 30 wherein the second electrode is located on the substrate.

32. The laser emitting apparatus of claim 31 wherein the second electrode is reflective.

33. The laser emitting apparatus of claim 32 wherein the substrate is reflective.

34. The laser emitting apparatus of claim 33 wherein the laser light is emitted through the second means for reflecting light from the organic active layer back into the organic active layer.

35. The laser emitting apparatus of claim 30 wherein the second means for reflecting light from the organic active layer back into the organic active layer is located on the substrate.

36. The laser emitting apparatus of claim 35 wherein the substrate is transparent.

37. The laser emitting apparatus of claim 35 wherein the laser light is emitted through the substrate.

38. The laser emitting apparatus of claim 30 wherein the vertical laser cavity structure is selected to produce laser light in a predetermined range of the spectrum.